

REMARKS

Applicants gratefully acknowledge the telephone interview granted by the Examiner on January 22, 2003. In the interview, applicants offered to cancel the pending claims (all directed to an apparatus) in lieu of new method claims, and to file a Request for Continued Examination simultaneously therewith. The Examiner agreed that, notwithstanding the previous restriction requirement and previous election of apparatus claims in response thereto, the method claims in this amendment could be examined because of the Request for Continued Examination.

Of the newly added claims 34-53, claims 34 and 53 are independent claims directed to a method of producing the electrodes of a semiconductor device that includes etching holes by etching a base material having a crystal orientation. Claim 34 recites, among other features, "a step of filling up the etched holes by plating a metal." Claim 53 recites, also among other features, "a step of forming a plated feeding film on the base material having the crystal orientation and on a side surface of each of the etched holes" and "a step of filling up the etched holes by plating a metal film on the plated feeding film."

These features recited in the independent claims make it possible to produce a semiconductor device having a narrow pitch and good height accuracy since the surface of the recesses can be covered with a single operation. Furthermore, because the bump electrodes in the semiconductor device have a projected shape and are made of metal, it is possible to connect or mount the semiconductor device on a substrate using only compression. In the case of a defect, the defective semiconductor device can be easily removed.

Applicants respectfully submit that claims 34-53 are not anticipated or rendered obvious by the cited references at least because the cited references do not disclose or suggest the above-quoted features of the invention.

The Office Action dated September 26, 2002 acknowledged (see paragraph bridging pages 2 and 3) that Takahiro et al forms terminal parts by filling recesses with conductive material/conductive resin by printing (see, e.g., Figs. 4-8) rather than by plating a metal or metal film as recited in claims 34 and 53. Such printing has the disadvantage that voids can occur in the filling portion and does not have the advantages mentioned above.

The Office Action dated September 26, 2002 relied upon Takashi et al (Japanese Patent Document No. 9-172021) and Yoshikazu (Japanese Patent Document No. 9-148378) as secondary references for their teaching of "using conventional anisotropic resin/conductive film . . ." Applicants respectfully submit that there is no disclosure or suggestion in these references of the recited features of forming filling the etched holes by plating a metal or metal film as recited in claims 34 and 53.

The Office Action dated September 26, 2002 also proposed that Yamaguchi et al (U.S. Patent No. 6,271,110) taught forming holes by anisotropy etching and that it would have been obvious to combine Yamaguchi et al with Takahiro et al. Applicants respectfully submit that there is no disclosure or suggestion in Yamaguchi of the recited features of forming the electrodes of a semiconductor device by filling the etched holes by plating a metal or metal film as recited in claims

34 and 53. Rather than plating, metal paste filled in the etched holes is heated to become solder balls.

The Office Action also relied upon Tago et al (U.S. Patent No. 5,508,561) and Hosomi et al (U.S. Patent No. 6,049,130) for a semiconductor device having a plurality of metal bump electrodes with metal bonding. Applicants respectfully submit that neither of these references discloses or suggests the recited features of forming the electrodes of a semiconductor device by filling the etched holes by plating a metal or metal film as recited in claims 34 and 53.

To the extent necessary, Applicants petition for an extension of time under 37 CFR § 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Deposit Account No. 01-2135 (Case No. 500.38090X00) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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